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Rev. 07/10/02

Versar INC.

19 September 1997

Mr. Michael McAteer
RPM, Office of Superfund
U.S. Environmental Protection Agency, HSRW-6J
77 West Jackson Blvd.
Chicago, Illinois 60604-3590
(312) 886-4663

Sent Via Federal Express

Re: Handouts for 23 September '97 Partnering Meeting on the Enviro-Chem Site

Dear Mr. McAteer:

Enclosed is a copy of handouts that we plan to use in our partnering meeting on 23 September '97 in your offices.

If you have any questions please feel free to call me at (215) 788-7844, extension 222.

Very truly yours,

G J Anastos

G. J. Anastos, Ph.D., P.E.
Project Manager

enclosure

cc: R Ball (Trustee)
N Bernstein (Trustee)
M Dowiak (Radian)
V Epps (IDEM)
C Gaffney (VERSAR)
T Harrison (CH2M HILL)
T Kruger (USEPA)
J Kyle (Trustee)
D Puchalski (HANDEX)
G Scarpone (HANDEX)

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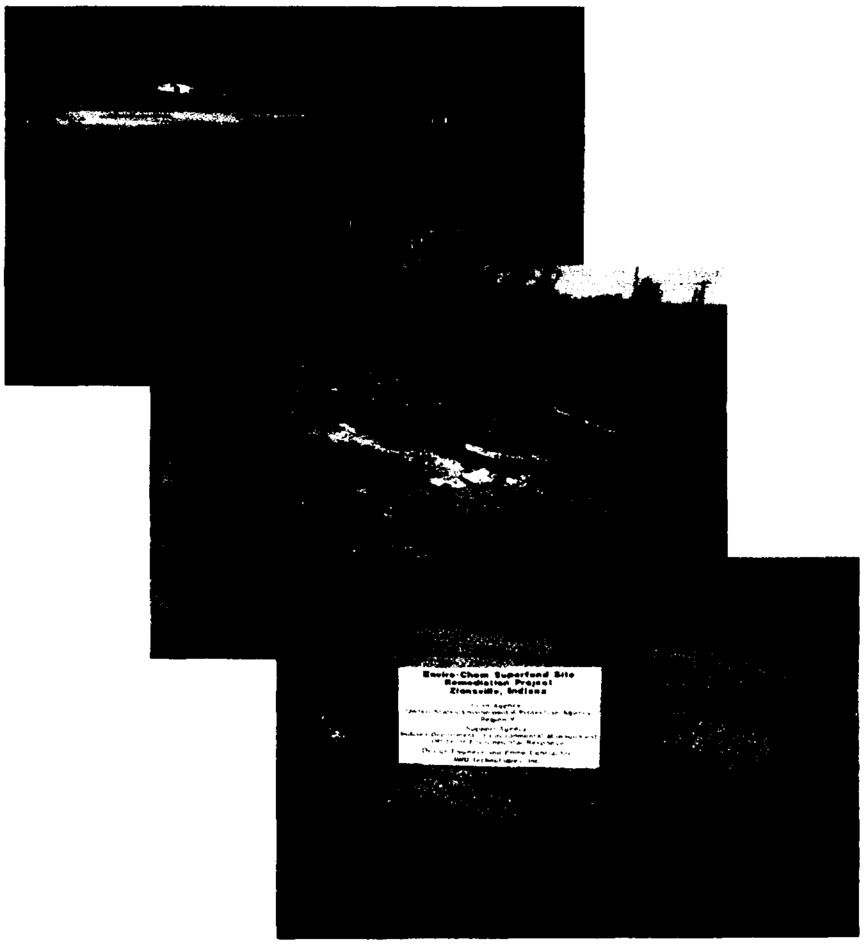
Partnering Meeting with U.S. EPA Region 5, IDEM and the Trustees of the Environmental Conservation and Chemical Corporation Site Trust Fund on the RAA at the Enviro-Chem Site, Zionsville, Indiana

SVE DESIGN UPDATE



Prepared by:

Versar INC.

In Association With

Handex®

23 September 1997

1701477

Table of Contents

Summary of the Soil Gas Survey of the SVE Treatment Area at the Enviro-Chem Facility, Zionsville, Indiana

Overview

A soil gas survey was performed to identify "hot spots" (i.e., zones of high soil gas concentration) in the SVE treatment area at the former Enviro-Chem site located in Zionsville, Indiana. The hot spot identification will be utilized to reposition SVE trench locations so that the remediation of the site can be expedited. A total of ninety-four (94) soil gas borings (188 drilling points) were drilled in the northern and central portions of the SVE treatment area. Each soil gas boring location consisted of two drilling points: one point was advanced to four feet below land surface (BLS) and the second point was advanced to eight feet BLS. The soil gas borings were drilled with a van mounted Geoprobe unit, which advances the sampling probe utilizing the hydraulic push technology. The survey was initiated on September 3, 1997 and completed on September 10, 1997. A description of field activities associated with the soil gas survey follows.

Site Grid Pattern Layout Procedures

A grid pattern for the soil gas borings was placed approximately 34 feet apart from one another to match available data on the zone of influence between trenches (i.e., that would result in a sample point spacing range of every 30 to 40 feet). On September 3, 1997 our personnel mobilized to the former Enviro-Chem facility to initiate the soil gas survey. We located the northeast corner of the southern concrete pad and used this as the starting point. From this point, we measured five feet in a northern direction and marked the location for soil gas boring SGB-1. We continued north approximately 34 feet and marked the location for soil gas boring SGB-2. This process was repeated until we marked soil gas boring SGB-14. At this time, we measured approximately 34 feet in a western direction and marked the location for soil gas boring SGB-15. We then continued south approximately 34 feet and marked the location for soil gas boring SGB-16. This process was repeated until the entire central and northern SVE treatment areas had been covered. A total of ninety-four (94) soil gas borings were located and marked. All measurements were collected using a Rolatape Measuring Wheel (Model 400), capable of obtaining measurements to the nearest foot.

Field Procedures

Environmental Field Services, Inc. (EFS), initiated drilling activities at the site on September 3, 1997, under the supervision of Handex. Drilling activities consisted of the following:

1) The advancement of the sampling probe to a depth of four feet BLS;

2) The sampling probe was then retracted approximately six inches to one foot, causing the disposable sampling tip to become dislodged from the sampling probe;

3) Dedicated polyethylene tubing was then inserted within the hollow sampling probe and lowered to the bottom of the boring;

4) The polyethylene tubing was then cut to the appropriate length and connected to a Xitech vacuum sampling box;

5) The pump on the vacuum box were then started and the soil boring and polyethylene tubing was purged of ambient air for approximately one minute;

6) The vacuum pump was turned off and a dedicated one-liter Tedlar bag was connected to the influent line of the vacuum sampling box;

7) The pump on the vacuum sampling box was then restarted and the Tedlar bag was filled to approximately 80 percent capacity;

8) The vacuum pump was then turned off and the Tedlar bag was closed and removed from the vacuum sampling box;

9) The Tedlar bag was immediately labeled. Information contained on the label included the sampling point identification, depth the soil gas sample was collected, date and time of collection, and the site name;

10) The dedicated polyethylene tubing was removed from the sampling probe and placed in a double lined trash bag. The trash bag was labeled and left on-site, on the decontamination pad located along the northwestern portion of the property;

11) The sampling probe was then removed from the subsurface and a second point was drilled to a depth of eight feet BLS. The second point was offset approximately one foot from the first drill point.

12) The sampling process described above was repeated while collecting the soil gas sample from the four to eight feet BLS interval.

After the soil gas sample was collected into a one-liter Tedlar bag and labeled, Handex personnel field screened individual soil gas samples with a Foxboro Century OVA, Model 108. Prior to field screening individual samples, the background ambient air concentrations were recorded. After field screening the sample, the background concentration was subtracted from the sample's field screen reading.

Calibration of Field Screen OVA

The OVA was factory calibrated by On-Site Instruments, located in Lewis Center, Ohio on July 28, 1997. The instrument was calibrated to a methane standard. Calibration procedures consist of a two point calibration process which includes a low calibration point (91.6 ppm methane) and a high calibration point (9,657 ppm methane). The instrument's calibration was rechecked by On-Site Instruments at the conclusion of the soil gas survey (September 15, 1997), and the calibration of the instrument was still within three (3) percent of the original calibration on July 28, 1997.

Analytical Laboratory Results

Based on field screening results and the spatial relationship to other samples, a total of eighteen (18) soil gas samples were selected for laboratory analysis of volatile organic compounds (VOCs) via EPA Method TO-14. The soil gas samples were shipped via an overnight courier under chain-of-custody control to Performance Analytical Inc., located in Canoga Park, California. All of the soil gas samples submitted for laboratory analysis were shipped to Performance Analytical Inc. on the same day the soil gas samples were collected.

Field screening results for soil gas samples collected from the zero to four feet interval ranged from zero parts per million volume (ppmv) to 30,000 ppmv (SGB-68). Field screening results for soil gas samples collected from the four to eight feet interval ranged from zero parts per million volume (ppmv) to 1,248 ppmv (SGB-9). Individual field screening results are summarized in Table 1. Soil gas isoconcentration (field screening results) maps were generated for each sampling interval and are provided as DWG Nos. 5A and 5B.

Ten soil gas samples from the zero to four feet interval were submitted for laboratory analysis. Analytical results ranged from 9.9 milligrams per cubic meter (mg/m^3) or 1.8 parts per million (ppm) in the sample collected from soil gas boring SGB-81 to 47,380 mg/m^3 or 9,644 ppm in the sample collected from soil gas boring SGB-68.

Eight soil gas samples from the four to eight feet interval were submitted for laboratory analysis. Analytical results ranged from 59.4 mg/m^3 or 15 ppm in the sample collected from soil gas boring SGB-9 to 5,606 mg/m^3 or 851.2 ppm in the sample collected from soil gas boring SGB-47. Analytical results of all the soil gas samples are summarized in Table 1.

TABLE 1. FIELD SCREENING RESULTS FOR THE SOIL GAS SURVEY OF THE SVE TREATMENT AT THE ENVIRO-CHEM SITE ZIONSVILLE, INDIANA					
Sample ID	Date	Field Screening Results (0-4' BLS) (ppmv)	Analytical Laboratory Data on Tedlar Bagged Air Sample (ppmv)	Field Screening Results (4-8'BLS) (ppmv)	Analytical Laboratory Data on Soil Sample (ppmv)
SGB-1	9/3/97	55		22	
SGB-2	9/3/97	123	108	65	
SGB-3	9/3/97	12		10	
SGB-4	9/3/97	20		4	
SGB-5	9/3/97	5		1.5	
SGB-6	9/3/97	2.5		148	288
SGB-7	9/3/97	173		47	
SGB-8	9/3/97	51		93	
SGB-9	9/3/97	38		1,248	15
SGB-10	9/3/97	1,498	2,327	NS	
SGB-11	9/3/97	108		88	
SGB-12	9/3/97	73		8	
SGB-13	9/3/97	28		16	
SGB-14	9/3/97	4		1.5	
SGB-15	9/4/97	0		1.5	
SGB-16	9/4/97	10		38	
SGB-17	9/4/97	83		19	
SGB-18	9/4/97	88	94.4	23	
SGB-19	9/4/97	23		13	
SGB-20	9/4/97	6		12	
SGB-21	9/4/97	132		158	190.9
SGB-22	9/4/97	22		36	
SGB-23	9/4/97	27		122	96.1
SGB-24	9/4/97	2		98	
SGB-25	9/4/97	20		25	
SGB-26	9/4/97	50		245	212
SGB-27	9/4/97	45		17	
SGB-28	9/4/97	58		4	
SGB-29	9/4/97	6		4	
SGB-30	9/4/97	2		1	
SGB-31	9/4/97	52		17	
SGB-32	9/4/97	87		50	
SGB-33	9/4/97	2		77	
SGB-34	9/4/97	7		79	
SGB-35	9/4/97	64		193	153.7
SGB-36	9/4/97	50		3	

TABLE 1. FIELD SCREENING RESULTS FOR THE SOIL GAS SURVEY OF THE SVE TREATMENT AT THE ENVIRO-CHEM SITE ZIONSVILLE, INDIANA					
Sample ID	Date	Field Screening Results (0-4' BLS) (ppmv)	Analytical Laboratory Data on Tedlar Bagged Air Sample (ppmv)	Field Screening Results (4-8'BLS) (ppmv)	Analytical Laboratory Data on Soil Sample (ppmv)
SGB-37	9/4/97	30		68	
SGB-38	9/5/97	249	40.9	53	
SGB-39	9/5/97	NS		NS	
SGB-40	9/5/97	15		23	
SGB-41	9/5/97	3		1	
SGB-42	9/5/97	2.5		2.5	
SGB-43	9/5/97	125	27.6	23	
SGB-44	9/5/97	6		15	
SGB-45	9/5/97	2		2	
SGB-46	9/5/97	3		50	
SGB-47	9/5/97	75		550	851.2
SGB-48	9/5/97	100		22	
SGB-49	9/5/97	75		150	
SGB-50	9/5/97	17.5		40	
SGB-51	9/5/97	6		22	
SGB-52	9/5/97	30		235	288
SGB-53	9/5/97	27.5		22.5	
SGB-54	9/5/97	11		5	
SGB-55	9/5/97	0		0	
SGB-56	9/5/97	4		7	
SGB-57	9/5/97	45		7	
SGB-58	9/8/97	1,000		7	
SGB-59	9/8/97	4,000	219.8	18	
SGB-60	9/8/97	11		13	
SGB-61	9/8/97	500		NS	
SGB-62	9/8/97	NS		NS	
SGB-63	9/8/97	38		23	
SGB-64	9/8/97	110	5.1	23	
SGB-65	9/8/97	20		3	
SGB-66	9/8/97	123		68	
SGB-67	9/8/97	28		8	
SGB-68	9/8/97	30,000	9,644	70	
SGB-69	9/8/97	6		0	
SGB-70	9/8/97	36		5	
SGB-71	9/8/97	6		18	
SGB-72	9/8/97	11		8	

TABLE 1. FIELD SCREENING RESULTS FOR THE SOIL GAS SURVEY OF THE SVE TREATMENT AT THE ENVIRO-CHEM SITE ZIONSVILLE, INDIANA					
Sample ID	Date	Field Screening Results (0-4' BLS) (ppmv)	Analytical Laboratory Data on Tedlar Bagged Air Sample (ppmv)	Field Screening Results (4-8'BLS) (ppmv)	Analytical Laboratory Data on Soil Sample (ppmv)
SGB-73	9/8/97	67		27	
SGB-74	9/8/97	346	308	32	
SGB-75	9/8/97	3		10	
SGB-76	9/8/97	15		20	
SGB-77	9/8/97	45		23	
SGB-78	9/8/97	198		12	
SGB-79	9/9/97	5		NS	
SGB-80	9/9/97	8		6	
SGB-81	9/9/97	225	1.8	70	
SGB-82	9/9/97	28		18	
SGB-83	9/9/97	10		60	
SGB-84	9/9/97	2		2.5	
SGB-85	9/9/97	1		3	
SGB-86	9/10/97	0		6	
SGB-87	9/10/97	1		3	
SGB-88	9/10/97	0		0	
SGB-89	9/10/97	0		2	
SGB-90	9/10/97	32		45	
SGB-91	9/10/97	22		55	
SGB-92	9/10/97	2.5		0	
SGB-93	9/10/97	0		0	
SGB-94	9/10/97	1		1	

Notes:
NS - Not Sampled
Soil gas samples were collected by Handex personnel and field screened with a Foxboro Century OVA, Model 108.
All results are reported in parts per million volume (ppmv).

Indicator Parameter Position Paper

Background

The soil vapor extraction (SVE) system's performance for the Enviro-Chem Revised Remedial Action (RRA) will be monitored through four measurements including:

- **Soil sampling**
  (within the treatment area at the completion of treatment);

- **Overall SVE system off-gas sampling**
  (for Table 3-1 parameters by two types of measurements, every two months during operation and spike/equilibrium concentration at the completion of treatment. The Table 3-1 parameters are a summary of contaminants previously detected in the soils at the site. In addition, the infrared vapor analyzer ahead of the granular activated carbon will continuously monitor total recovery rates on a real-time basis from the SVE system.);

- **Trench level air sampling**
  (for Table 3-1 parameters every two months); and

- **Trench level air monitoring**
  (utilizing a field PID approximately weekly.)

Since completion of RRA is contingent upon two measurements, off-gas spike/equilibrium and final soil concentrations, as identified in bullets one and two above and the management of the trench air flow patterns will be based upon field PID measurements, as identified in bullet four above, a third trench level measurement for the 16 parameters identified in Table 3-1 appears to be redundant and unnecessary. The two additional final system performance measurements for till water and stream water do not influence the selection of indicator parameters, and are therefore not discussed further in this position paper.

Selection of Indicator Parameters

This paper shows the appropriateness of the use of indicator parameters during the operation of the SVE system rather than the use of the full 16 parameters identified in Table 3-1 to measure the trench level removal efficiencies. This use of indicator parameters is limited to the trench level monitoring in bullet four above and does not affect the monitoring referenced in bullets one, two or three. The use of indicator parameters to monitor the individual performance of the SVE trenches was proposed in our meeting of 14 August '97. The overall system performance will continue to be monitored at the discharge prior to the carbon vessels for all Table 3-1 parameters, i.e., parameters previously detected in on-site soils (reference Table D-2 of the Revised Exhibit A, Appendix D) and compliance (i.e., SVE system shut down) will also be monitored for all Table D-2 parameters.

The selection of indicator parameters was performed in a two stage process. First our review of Table 3-1 resulted in the segregation of parameters into four broad chemical groups, (i.e., ketones, aromatics, vox's and semi-volatiles). Second, a selection algorithm for parameters within each group was utilized. Use of a representative parameter from each of these chemical groups would simplify evaluation of individual trench performance resulting in four, rather than 16 chemical analyses. We evaluated three indicator parameter selection algorithms, as summarized below:

- **Lowest vapor pressure compound**
  (the parameters with the lowest vapor pressure should be those that will be the most difficult to remove using soil vapor extraction)

- **Lowest soil concentration allowable**
  (the parameters with the lowest allowable soil concentration should be the most toxic)

- **Lowest equilibrium action level required**
  (a hybrid of the first two bullets that incorporates both the difficulty of removal and the toxicity of each parameter, from Table D-2 of revised Exhibit A)

The lowest vapor pressure/most difficult to remove parameters did not correlate well with the acceptable soil concentration/toxicity parameters in our comparison of Table 3-1 parameters. To over come this problem, we utilized the calculated equilibrium concentration as a hybrid of the other two selection algorithms. This calculated equilibrium factors both the vapor pressure and allowable soil concentration into a single value for each parameter that correlates well with the lowest vapor pressure or most difficult to remove parameter within each group. This calculated equilibrium action level is the same utilized for the spike analysis to determine if the soil concentration levels of Table 3-1 parameters are under action levels allowing the SVE system operation to be terminated. Our hybrid analysis resulted in the selection of the following indicator parameters:

Chemical Group	Indicator
Ketones	methyl isobutyl ketone
Aromatics	ethyl benzene
VOX's	tetrachloroethane
Semi-Volatiles	phenol

Comparison of Selection Algorithms Applied to Table 3-1 Parameters

Parameter [1]	Lowest Vapor Pressure [2] (mm Hg)	Acceptable Soil Concentration Levels [2] (ug/kg)	Equilibrium Action Level from Table 3-1 [3] (mg/L)
Ketones			
methyl ethyl ketone	77.5	[redacted]	316.6
methyl isobutyl ketone	[redacted]	18,200	[redacted]
Aromatics			
acetone	270	[redacted]	888.9
ethyl benzene	[redacted]	207,464	[redacted]
toluene	28.1	546,134	146.6
xylenes (total)	10	5,596,192	60.1
VOX's			
1,1-dichloroethene	600	762	3,297.8
1,2-dichloroethene (total)	208	5,782	1,143.0
methylene chloride	362	126	1,741.5
tetrachloroethane	[redacted]	77	[redacted]
1,1,1- trichloroethane	123	47,871	927.0
1,1,2- trichloroethane	30	71	226.1
trichloroethene	57.9	812	433.1
vinyl chloride	2,660	[redacted]	9,496
Semi-Volatiles			
1,2 dichlorobenzene	1	370,158	8.3
phenol	[redacted]	[redacted]	[redacted]

References:
1- Table 3-1 of QAPP pg 1-15 (parameters previously detected at the site)
2- Table D-1 of Revised Exhibit A
3- Table D-2 of Revised Exhibit A

Vacuum Piezometers Position Paper

The use of vacuum piezometers was initially discussed to measure the removal efficiency of contaminants on a trench-by-trench basis in our 14 August '97 meeting with U.S. EPA. U.S. EPA also requested in their 18 August '97 "Concept Approval" letter that the Trustees evaluate the use of vacuum piezometers.

Rational for Evaluation of Vacuum Piezometers

The Trustees and their technical consultants reviewed the use of vacuum piezometers, based upon five areas, including:

- When are vacuum piezometers normally used?
- Was the SVE design basis conservative enough to overcome operational issues?
- How will the overall system performance be evaluated?
- Will implementation of vacuum piezometers be cost effective?
- Are there operational issues that will be impacted by the installation of the vacuum piezometers?

When are vacuum piezometers normally used?

Vacuum piezometers are normally utilized when there are heterogeneous soils or a lack of pilot vacuum data on homogenous soils. Neither is the case at the Enviro-Chem site. Review of the boring logs from the site demonstrate general homogeneous stratigraphy across the SVE treatment area with some localized sand lens, and TerraVac has run pilot SVE studies to determine the pressure drops and zones of influence for design of the full-scale SVE system.

Was the SVE design basis conservative enough to overcome operational issues?

The soil vapor extraction (SVE) system design for the Enviro-Chem Revised Remedial Action (RRA) was conservatively developed based upon the TerraVac pilot data with additional safeguards to meet a contractual performance specification. The performance specification was for an incentive-based design to ensure optimal design, management and operation of the SVE system. The performance specification anticipates a two year operational period for the SVE system with incentives for a quicker clean-up and penalties for a longer clean-up. The design team has developed a conservative approach with sufficient capacity (i.e., with additional trenches positioned to intersect hot spots identified in the recent soil gas survey and reserve vacuum head with flow controls) to attack the contamination early on and assure that the site will be cleaned up before the two year performance period is over. To assure that the two year performance period was a maximum, a one year period was utilized to calculate pore volumes necessary to theoretically clean-up the site. This design basis is a year shorter than the two year operational time frame initially anticipated by all concerned parties. In addition, based upon current information, it is likely the more than 75 percent of the contamination will be removed during the first six months of operation. The remaining time will be utilized tracking down hot spots for remediation.

How will the overall system performance be evaluated?

Operation of the SVE system can be terminated only after four measurements, (i.e., spike/equilibrium of off-gas, soil, till water and stream water) identified in Revised Exhibit A are met. Two additional measurements for the management of system performance, (i.e., overall-level and trench-level SVE system off-gas sampling for Table 3-1 parameters) have been identified. During the preliminary design of the SVE system, a seventh performance measurement (i.e., field PID analysis of trench off-gas) was added to provide real-time data for optimizing the SVE system air flow patterns. The operational plan for the SVE system is based upon focusing air flow through the highest concentration of contaminants first, (as detected in the soil gas survey) and subsequently shutting down or reinjecting air into trenches to optimize the overall system performance to a period of less than two years.

Is there ant justification for vacuum piezometers?

A vacuum piezometer can measure location dependent performance of a section of a trench by identifying a pressure drop. It is important to note that the SVE system has been designed with multiple overlapping zones-of-influence. Therefore, any one vacuum piezometer could be measuring the pressure drop of multiple trenches and/or sections of the same trench, with little or no correlation to the actual air flows. With respect to the number of piezometers that might be needed, utilizing existing TerraVac pilot data to forecast the piezometers potential zone-of-influence to measure a pressure drop, it is estimated that a piezometers would have to be installed in the range of every 15 to 20 feet of trench length. This would require the installation of two or three vacuum piezometers on each side of a trench to attempt evaluate its overall potential removal efficiency (i.e., six piezometers per trench). There will be 81 trenches covering more than 2.75 acres. If a sampling of 10 percent of the trenches is thought to be representative, then approximately eight trenches would have to be monitored for a total of 48 piezometers (i.e., 8 trenches x 6 piezometers per trench). This would add an additional installation cost of between $250,000 to $500,000. However, even with the installation of that extravagant amount of piezometers, there would be no assurance that the 10 percent would be representative. As a practical matter using piezometers to monitor 10 percent of the trenches will provide data that will make no difference.

Does the installation of vacuum piezometers increase the risk of the remedy failure?

The placement of vacuum piezometers is further complicated by the two separate layered SVE systems that have an impermeable liner between them. Installation of vacuum piezometers in the native soil would require boring through the excavated soil system, piercing the impermeable layer between the two system, and then boring into the native soil. Even with great care, the installation of the vacuum piezometers is likely result in short circuiting between the systems, and greatly increasing the risk of remedy failure and/or the duration of the operation for the SVE system. In addition, the short circuiting would also adversely impact the accuracy of vacuum piezometer pressure drop readings. This short circuiting from piezometer installation will thus also adversely effect the accuracy of piezometer readings.

Conclusion

The use of vacuum piezometers would generate additional data, however, there is little use for the data. The question to be asked is, will the redundant data obtained from the vacuum piezometers significantly change the operational plan for the SVE system? The present operation plan, as discussed above, is to manage the flow patterns in the treatment area through the use of field PID measurement with confirmation based upon Table 3-1 analysis on the overall system-level and at the trench-level measurements. In addition, the design of the system is such that there is significant flexibility to address hot spots. Finally, any potential residual contamination detected from final soil sampling will be addressed cost effectively through vertical extraction points to treat localized problems, rather than construction of new trenches. The vacuum piezometers do little to add management measurements that would change this overall operation of the SVE system discussed above, and could create significant risk for operational failure do to the short circuiting. Consequently, vacuum piezometers will not be used.

ENVIRO-CHEM REVISED REMEDIAL ACTION
CAPITAL EQUIPMENT LISTING AND DELIVER TIMES

Capital Equipment Item/Manufacturer & Model		Onsite Delivery Time
Off-gas Vapor Analyzer	"not ready to change vendor"	15.5 weeks
Mine Safety Associates (MSA)		
Pittsburgh, PA		
Model 3800 Infrared Vapor Analyzer		
4 Point Perma-pure Humidity Removal System		
4 Point Sample Pump and Sequencer		
Self contained Cabinet Mounted, Heated and Cooled		
Programmable Logic Control (PLC) Panel	likely to be used	15 weeks
Clinton Controls, Inc.		
Lock Haven, PA		
Manufactured to VERSAR/HANDEX Specifications		
General Electric-90-30 PLC CPU		
Three Input/Output Racks		
14 Square-D IEC-type Integral Starter and Overloads		
Single Phase Transformer		
Control Instrument Transformer		
Self Contained, Free Standing, 8 feet wide enclosure		
Pre-Engineered Building	* most important need now	13 weeks
Parkline Northeast Buildings, Inc.		
Wilmington, Delaware		
Integral Wall and Panel Steel Building		Hill will check today
30 feet wide x 46 feet long x 12 feet tall ate EAVES		
One 8 feet wide roll-up door		
Three 3 feet wide walking access doors		
Design Wind Load 90 miles per hour		
Design Snow Load 35 Pounds per square foot		
SVE Blowers and Motors	should have no problem since these are oversized.	13 weeks
Roots Manufacturing, Inc.		
Local Rep-West Chester, PA		
Roots Model 7017-81L2 Blower		
75 Horsepower, 460v/3 Ph/60 Hz		
Replaceable 1200 scfm inlet air filter		
Replaceable 40 scfm fresh air filter		
8" Discharge Silencer		
Skid Mounted with motor, shieve drive, blowers and filters		

Hill has one week to give ok on this page + next.

Flexible stuff

ENVIRO-CHEM REVISED REMEDIAL ACTION
CAPITAL EQUIPMENT LISTING AND DELIVER TIMES

Capital Equipment Item/Manufacturer & Model	Onsite Delivery Time
Large Diameter (8 to 12") PVC and CPVC Vapor Piping & Valves	11 weeks

Various Piping Vendors
Valving to match specification Section 15000

Transfer Pumps (X-P)
Ebara Pump, Inc.
East Hartford, Connecticut
Stainless Steel Pump Series
304 SS Pump Housing and Impellers with Viton Mechanical Seals

Hill needs to JJ this carefully.

P-100 A and P-100 B	5 Hp, CDU-200 Series (AS Feed Pumps)
P-1A and P-1B	3 Hp, CDU-120 Series (GAC Feed Pumps)
P-1	½ Hp, CDU-70 Series (K-1 Pump)
P-2	1 Hp, CDU-120 Series (T-1 Condensate Pump)
P-7	1 Hp, CDU-120 Series (HX-1 Circulation Pump)

Aboveground Tanks — 10 weeks
Environetics, Inc.
Lockport, Illinois
Two Permanent 150,000-gallon tanks erected at site
Two Rental 150,000-gallon tanks erected at site

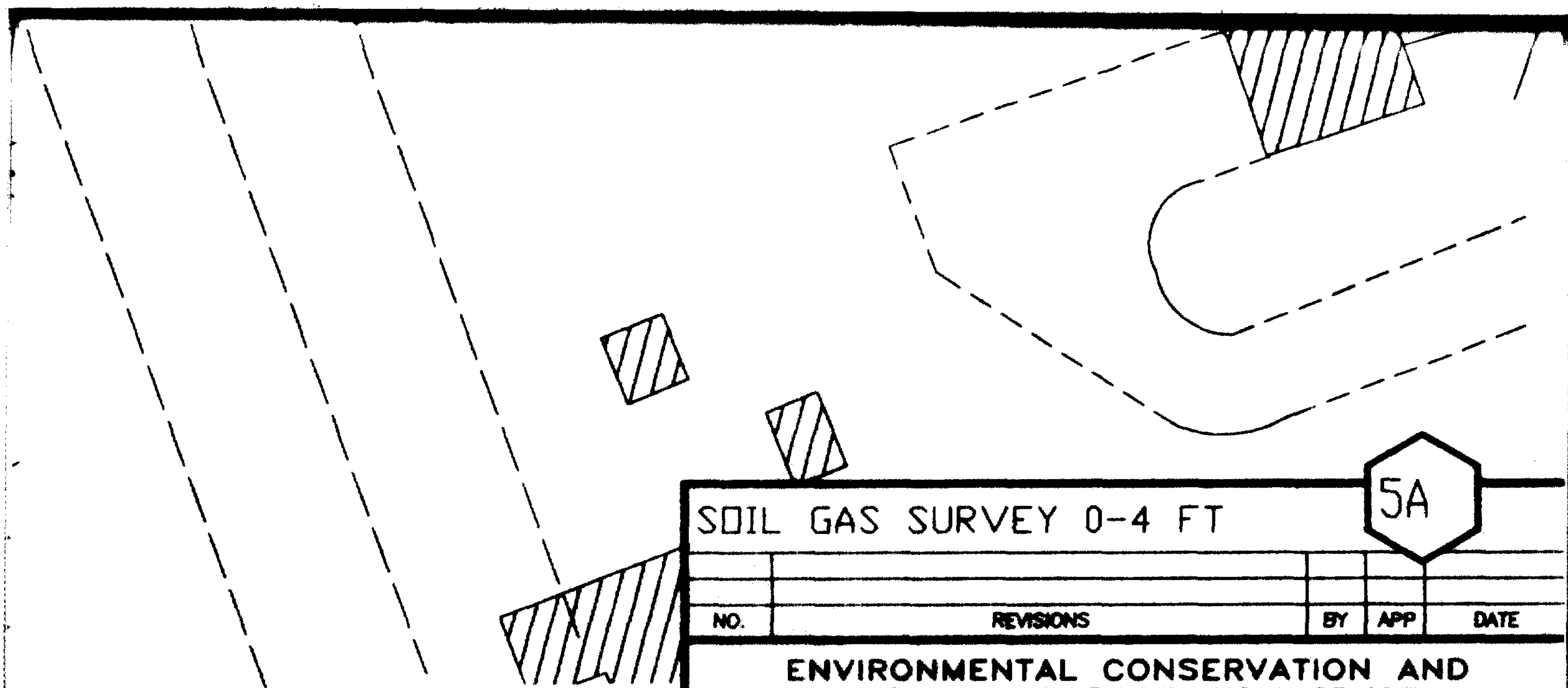
Air to Water Heat Exchanger — 10 weeks
X-Changer, Inc.
Ct/V-200 Low Carbon Steel
Air to Water Heat Exchanger with lined cooing tubes

Building Ventilators (X-P) — 10 weeks
Super Vac, Inc.
Loveland, Colorado
P-200 SE Super Vac Smoke and Buildng E™
20" Stainless Fan and Integral Steel Housing
0.75 Hp, 230 v/1 phase/60 Hz NEMA 7 X-P Motor

K-1 and K-2 Knock-out Tanks — 10 weeks
Manufactured to VERSAR/HANDEX Specification
60-inch complete vacuum pressure vessel
30-inch complete vacuum pressure vessel
Epoxy lined low carbon steel
TEX-MESH or Koch Demister Paad sized for vessel

ENVIRO-CHEM REVISED REMEDIAL ACTION
CAPITAL EQUIPMENT LISTING AND DELIVER TIMES

Capital Equipment Item/Manufacturer & Model	Onsite Delivery Time
Building Heaters (X-P)	10 weeks
Chromalox, Inc. Or Modine, Inc.	
Pittsburgh, Pa	
Three 12.5 Kilowatt Fan Induced Radiant Heaters	
Wall Mounted, NEMA 7, expolsion-proof	
Wall Mounted, NEMA 7, remote thermostat	
SVE Instrumentation	9 week
Various Vendors as required	
Dwyer Air Flow Velocity Meters	
Dwyer Air Flow Pressure Indicators and Transducers	
Dwyer Differential Pressure Indiacator and Transducer	
Flow-Tech Humidity Monitors	
Chromalox Temperature Thermocouples	
Vapor Phase GAC's	9 weeks
Envirtrol, Inc., Sewickley, Pennsylvania	
Barneby & Suttcliffe Inc., Columbus, Ohio	
13,000 Poind Granualr Activiated Carbon Skids	
Maximum Air Flow 4,000 scfrm	



SOIL GAS SURVEY 0-4 FT

5A

NO.	REVISIONS	BY	APP	DATE

ENVIRONMENTAL CONSERVATION AND CHEMICAL CORPORATION TRUST

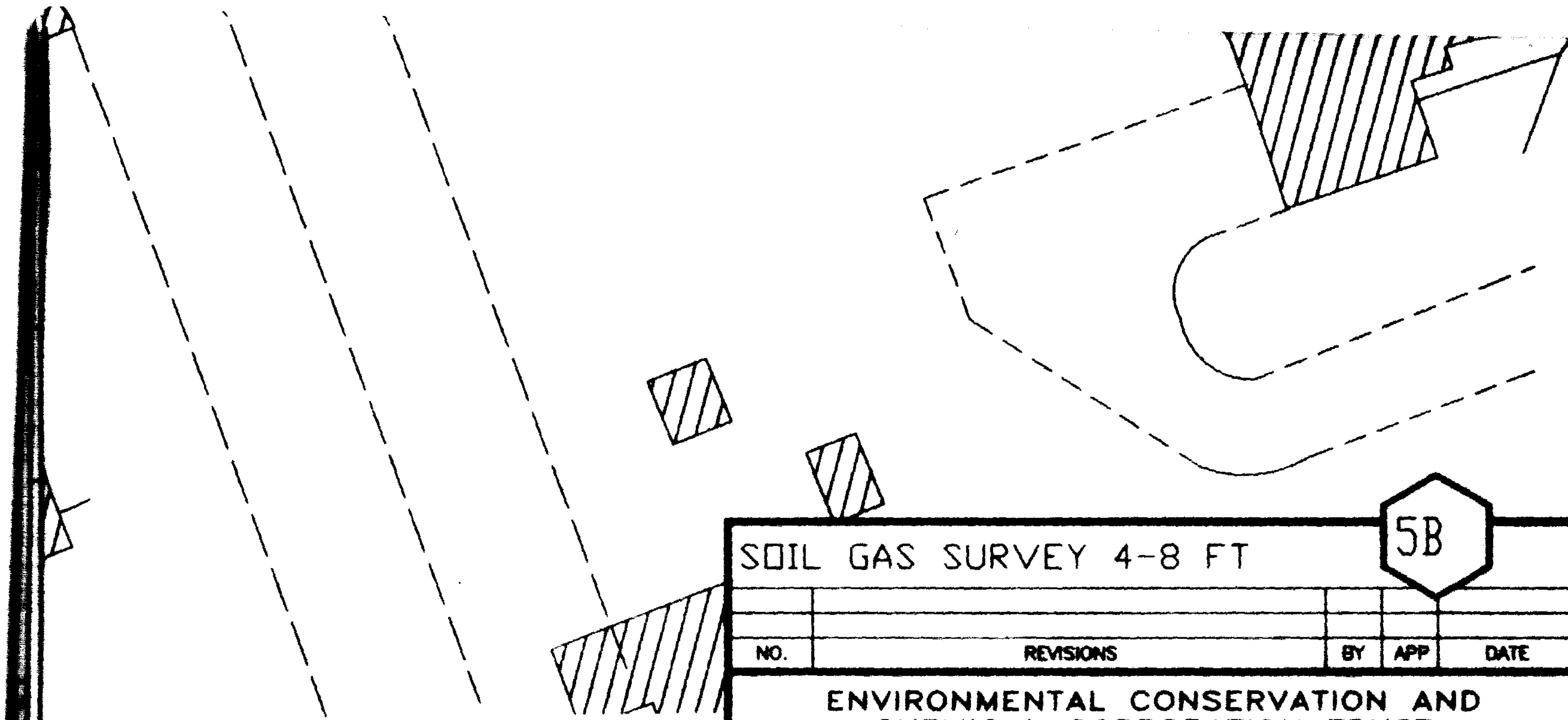
DESIGNED DCP	DATE 09/10/97	
DRAWN SJH	09/17/97	
CHECKED DCP	09/17/97	

ENVIRO-CHEM SUPERFUND SITE

SOIL GAS ISOCONCENTRATION MAP (ppmv)
ZERO TO FOUR FEET BELOW LAND SURFACE

Versar INC.
1900 FROST ROAD, SUITE 110
BRISTOL, PA 19007
(215) 788-7844

PROJECT NO. 3709.001	SCALE 1" = 30'-0"
DRAWING NO. 115082A	SHEET 5 OF 6



SOIL GAS SURVEY 4-8 FT

5B

NO.	REVISIONS	BY	APP	DATE

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ENVIRONMENTAL CONSERVATION AND
CHEMICAL CORPORATION TRUST

DESIGNED DCP	DATE 09/10/97	
DRAWN SJH	09/17/97	
CHECKED DCP	09/17/97	

Versar INC.
1900 FROST ROAD, SUITE 110
BRISTOL, PA 19007
(215) 788-7844

ENVIRO-CHEM
SUPERFUND SITE

SOIL GAS ISOCONCENTRATION MAP (ppmv)
FOUR TO EIGHT FEET BELOW LAND SURFACE

PROJECT NO. 3709.001	SCALE 1" = 30'-0"
DRAWING NO. 115082A	SHEET 5 OF 6